

5. ANNOTATED LIST OF PREVIOUS STUDIES ON THE CAPITOL

1.11.67 I. GOALS AND ASPIRATIONS OF UTAHNS: A STATE CAPITOL *DR.* *EVERETT L. COOLEY*

Birdseye marble or golden travis from Utah Co in the House, Sup Ct and Gold rooms. Onyx or travertine from Tooele Co used in vestibule and Senate chambers

4.10.78 II. NATIONAL REGISTER OF HISTORIC PLACES INVENTORY— NOMINATION FORM

Prepared by Lois Harris, Preservation Historian, Utah Heritage Foundation

Capitol Campus sits on 34 acres, deeded to the state by SLC; the deed provided that the land be maintained as a park. 23 of 34 acres can still be considered a park.

NO DATE III. EXTERIOR ACCESSIBLE ROUTE SIGNAGE MANUAL *DFCM*

- 4. Procedures by Facility Type
 - New Construction
 - Alteration
 - Existing Facilities
 - Historic Design Consideration
- 5. General Design Procedures
- 6. EARS Systems Sign Locations: Vehicular/Pedestrian
- 7. General Design Guidelines
 - App. 1. Interpretations/References
 - App 2. ADA Symbols/DFCM Symbols
 - App 3. Character Interpretations of the ADA Guidelines
 - App 4. Materials and Applications

The manual provides guidelines for the design of a sign system for individuals with disabilities—the Exterior Accessible Route Signage (EARS) system. The manual is a supplement to the ADA and specifically aimed at exterior route signage.

Two sections apply to the Capitol project. Existing facilities (pg 15) and Appendix 1 for Historic Design Consideration (pg 17). The addition of an EARS system to an existing facility should provide the same information as an EARS system for new construction. If readily achievable, the EARS system for an existing facility “shall, as a minimum, identify and provide the direction of at least one accessible route from the site entrance to the accessible entrance (s) of the facility.” If an appropriate existing master sign system is in place, the EARS system should be incorporated into that existing system and match its graphic and design elements.

However, if expanding the master sign system is inappropriate a new EARS system for a historic facility shall be “compatible with materials, character and details of the historic architecture and its site environment,”

ADA requires that information, displays, etc. Can be seen by a seated person. Exhibits should be no higher than 44” above the floor surface.

A procedure chart for developing the EARS system is on page 14. This chart outlines DD, CD, bidding and fabrication and installation phases.

Examples of general design procedures (pg20), route sign maps (23) and a sign schedule (pg 25), are also

included. An extensive 16 page description of signage materials and applications concludes the manual.

8.2.82 **IV. SOIL AND FOUNDATION INVESTIGATION. EMERGENCY OPERATIONS CENTER (DATA PROCESSING CENTER).**

Rollins, Brown and Gunnell, Inc. Professional Eng.

1. Existing Site Conditions
2. Subsurface Soil and Water Conditions
3. Foundation Considerations and Recommendations
4. Site Preparation, Compacted Fill Requirements and Lateral Earth Pressures
5. Results of Field and Laboratory Tests

Fig 1. Location of Test Holes

Fig 2. Log of Borings

Fig 5. Unified Soil Classification System

Fig 6. Allowable soil bearing pressures for footings

Fig 7. Summary of Test data

This 1982 soil and foundation investigation indicates an elevation difference of about 50' exists throughout the site. Sub-surface materials are alluvial, mainly granular, undisturbed soils. There is no ground water problem, but an obscured fault line lies to the North and East of the site.

Borings were made and the Unified Soil Classification system standards applied to provide graphs in figures 2, 3, and 4. A summary of test data (no page number) is charted.

The zone of significant stress lies in the gravel and cobble stone zone (40-50' depth).

A maximum settlement factor will not exceed 1 inch; with the recommended foundation structure and column spacing of less than 20' it should not exceed .5 inch.

Site preparation includes a 49' excavation on the NE corner and a 25' depth on the SW corner.

1.13.84 **V. CAPITOL: SPACE REQUIREMENT REPORT** *TEK FACILITIES PLANNING CONSULTANT*

- A. Departmental Requirements: function, occupancy, personnel and space requirements of each department
- B. Adjacency and visitor traffic data
- C. Requirements for commonly used facilities
- D. Summary of personnel and area requirements
- E. Recommendations

A chart summarizes the personnel and space requirements of each agency for a projected ten year period (1985-1995). Growth was expected in the State Treasury and Supreme Court . But, at the time the report was written each agency already complained of limited space and inefficient facilities.

Substantive information on each agency's function, organization and special area requirements contained in the report could be useful as a base for an updated study. At the time of the report,

Archive office was to be relocated, freeing 1,572 sq ft of space in the basement:

Division of corrections moved, freeing 3,830 sq ft;

Criminal and juvenile justice shifted freeing 2,520 sq ft.

Although these moves do not reflect current conditions the **precedent for freeing space has been established.**

In a study of the first floor done in 1982, suggestions were: moving the gift shop, creating an information desk, establishing a circular audio visual display area in the SW wing, replacing the current display cases with cases more historically compatible with the building and laying carpet. Interpretative modifications included: displays describing Utah Cultural History, Utah Natural History, Utah Land, The Utah State Capitol and a temporary exhibit that could be used as timeliness suggests.

A chart on agency adjacency requirements is on page 65. Charts on traffic flow to determine office locations are on pages 66-67. Schedules of conference requirements are on pages 69-71. Based on these conference requirements a recommendation to double committee room space (7,583 sq ft) was made then not implemented. A departmental growth projection (pg 77) shows the Supreme Court as a growth area. Recommendations for square footage increases in office space are on pages 80-85. Proposed master plans are on pages 86-87.

6.12.90 **VI. RENOVATION PROPOSAL: CENTENNIAL PROJECT** KEVIN WATTS, ARCH

A. Phases 1, 2, 3

Division 1	
Division 2	Selective Demolition
Division 5	Cold Formed Metal Framing
Division 6	Rough Carpentry
	Finish Carpentry
	Architectural Woodwork
Division 7	Joint Sealers
Division 8	Finish Wood Doors
	Fishish Hardware
Division 9	Veneer Plaster
	Gypsum Drywall
	Acoustical Ceilings
	Carpeting
	Painting
	Wall Covering
Division 15	Mechanical
Division 16	Electrical

1994 B. 11x17 appendices: Space Allocation study, renovation proposal sketches

9.19.90 C. Committee Room Furniture Layouts

In the project manual under conditions of the contract the construction manager was asked for extensive participation in the preconstruction phase. For example the construction managers' job was to:

review designs during their development, coordinate contract documents, provide preliminary project budget requirements. etc.

In 1990 this renovation proposal was budgeted at \$ 3,500,000. Project alteration work consisted of selective demolition and reconstruction of interior partitions, ceilings, flooring, finishes, HVAC and electrical work. This work was done in the following areas: Attorney General's Office, Supreme Court Law Library, Governor's Suite, House Leadership, Legislative Committee Rooms, Legislative support restrooms, Auditor General's Office, Legislative Research and General Counsel Office, Legislative Committee Rooms and Printing.

The selective demolition included: removal of interior partitions, doors & casework. Cold-form metal framing—"C" shaped load-bearing steel studs—was installed.

Rough carpentry consisted of: wood framing grounds, nailers, blocking, furring, sheathing and drop ceilings. Running and standing trim, door and window casings, chair rails, crown moldings and cabinet tops comprised the architectural carpentry.

Two-component veneer plastering was applied over interior concrete and masonry substrates as well as existing plaster surfaces. Gypsum base was also used.

Acoustical panel ceilings with exposed suspension were installed. Carpet, paint, acoustic wall carpet, vinyl-coated and fabric wall covering completed the finish work.

Specialty items were tack/chalk-boards and manually-operated multi-directional partitions. Committee room seating and 60 wood tables with laminate in-lays were provided.

Several modifications were made to the HVAC. Electrical connections for equipment, raceways, electrical boxes, over current protection devices, interior building lighting, emergency light & power systems, fire alarm & detection systems and telephone raceway systems, grounded out the electrical work.

1980'S? **VII. EXHIBIT HALL: FORGING NEW FRONTIERS** *(PART OF KEVIN WATTS STUDY?)*

This study consists of graphic solutions to the presentation of Utah exhibits. Sketches illustrate layouts for specific exhibits like Garn and the Mormon Meteor. One requirement of this study is space for a theater.

OCTOBER 1991 **VIII. TERRA COTTA AND OTHER MASONRY MATERIALS**

Theodore H.M. Prudon, Ph.D., ALA & Burtch Beall, FAIA

"deterioration of the exterior masonry, esp. around dome and drum. Recommendations include improvement of roofing & flashing details & replacement of some terra cotta units. Some of this work has been implemented as part of general maintenance activities"

"Brick was used to help form the detail as was observed in the column bases."

Detailing does not seem to follow the typical standard details of the period. (p.3)

The void between concrete structure and the terra cotta unit was most likely filled solid with grout to secure the terra cotta and its anchors.

Lath was not used on the stucco walls, but may have been used in the soffit areas (speculative). (p.4)

Vertical cracking, typical in construction of terra cotta block on drum base, was NOT observed.

Lower cornice, when viewed from the top, shows joint-related and unit cracking.

"Roll" joint prevents water penetration, but because of the side location of the joint, repointing is difficult and not done very often. (p.5)

All joints have been covered with a bitumina or have been caulked or repointed at one time or another.

Upper blocks of cornice do not protrude substantially and probably rest directly on top of the wall.
Likely that balustrades were not installed with any anchoring whatsoever.
Mortar joints appear to have cracked and broken, probably not as a result of mortar shrinkage but more likely by the thermal movement experienced by the railings. (p.6)
Front facing of several solid sections of the balustrade have cracked, in one instance potentially dangerous.
Damage at column bases raises serious questions on the quality of stucco facing, colonnade soffit and architrave soffit of upper cornice. (p.7)
Recommend further investigation.

1.8.93 **IX. SEISMIC RETROFIT STUDY** (ABSTRACT AND EXECUTIVE SUMMARY
20PGS) *REAVELEY ENGINEERS*

This 1993 study examined the vulnerability of the Capitol to earthquake ground motion. Life safety was the primary concern in the study, but because of the buildings importance, historical items were also included within the scope. There were viable alternatives to improve the seismic resistance. The problem boiled down to cost effectiveness.
Six retrofit options were proposed. (pg 8) Three were worthy of investigation. The findings indicated that: "Base isolation, upgraded to Performance Goal D (pg4), will be found to be the most efficient, cost effective and serviceable of the various retrofit options."
Construction cost estimate for the base isolation scheme was \$ 60,650,000. Phase work would increase the cost.

AUG, '95 **X. UTAH STATE FACILITIES EVALUATION AND 20 YEAR PLAN OF ACTION** (3 COPIES) *ELDREDGE & NICHOLSON, ARCHITECTS*

1. Executive Summary

Facilities Evaluation 1967 new Capitol Commission recommended by E.Cooley. Capitol has no coherent vision, most evident in the display space, ground floor. recommend a 20yr maintenance budget, reaching restoration by 2015 for centennial. Many studies have huge budgets which are immediately unreasonable, so the whole study gets "shelved."
Notes degradation of asbestos/limestone coating on the drum, due to water infiltration (not evident in 1991). When the copper dome was redone, the ledges and balconies were not done. Waterproofing of the dome was not seen as a complete job, but just a reaction to the copper roof blowing off. Granite needs cleaning. Seismic threat looms. 1992 study recommended identifying the exact location of the faults in close proximity to the Capitol: not done.

2. Observations & recommendations (see pp 10-44)

Introduction evaluation consisted of site visits, review of field data, and analysis of existing construction documents. 5 site visits referenced, with as many meetings. see p. 6 for previous studies referenced.

SURVEY & RECOMMENDATIONS: ARCHITECTURAL

Site: asphalt paving, concrete curbs, walks, stairs & piers show much weathering. New concrete walks don't match color and texture of old. Recommended that paving be replaced with a decorative colored concrete paving system; repair and replacement of damaged concrete elements, matching

color & texture.

Basement offices have very low ceilings, or exposed mechanical in the occupied spaces. These spaces also have minimal air movement. It has been reported that the Basement was originally used for stables.

Majority of the **office** areas have **partitions** that close off at the ceilings, preventing air circulation as designed and with existing mechanical system.

- § Recommended that all offices w/o a direct connection to the capitol function be moved off-site
- § remove existing offices 1st floor E&W entrances, restore vestibules
- § prepare a exhibition plan for content and space distribution
- § when offices are remodeled, remove floor-to-ceiling partitions and install open workstations
- § restore historical character & detailing of all spaces scheduled for remodeling

Exterior (pp13-15) terra cotta and concrete stucco inspected in 1991 by Theodore Prudon, PhD, [*historic masonry expert, now at Columbia Univ*] for Beall study [*though I cannot find him mentioned there or anywhere else*]. At that time, none was removed for inspection of fasteners. Drum columns “are brick masonry infill with a concrete and stucco finish. The base of a couple of the columns are deteriorating and the concrete has broken out to expose the masonry infill to the weather.” Upper walls of drum, peeling stucco has been analyzed & contains limestone in a 25% chrysotile asbestos binder. This damage not evident in 1991, and due to water infiltration at the cornice level above. Dome & lantern re-coppered; upper carillon section also painted recently.

Highest balustrade is sheathed in copper, original to the building. Not possible to inspect condition beneath, or the attachment of the copper.

Original doors at all entrances are historical and require consistent adjustment and maintenance.

South entrance stairs significantly damaged: 1916 dwgs indicate waterproofing membrane was deleted

Interior (pp16-17) hollow metal doors recently re-grained; House lounge has painted hardware, remove; Documents indicate Oolite was used on the ground floor for the walls. Whatever’s there has been painted over, can’t tell if it’s plaster or oolite, if the latter, recommend to clean & restore. Restore rotunda floor skylight. Inspect marble fasteners. Replace carpet. Repair tile floors, with custom tile, cleaned, regROUTED, and sealed. Replace acoustic panel ceilings in offices as they are remodeled.

Fire Code Compliance (pp18-20) Recommend sprinkling entire building. Remove storage in exit halls. Install new alarm system. Update exit hardware. Separate mechanical room from rest of basement with 2hr enclosure. Repair/replace basement sprinklers. Review and correct dead-end corridor (American Legion) basement.

Energy (pp20-21) Entrance vestibules leak energy: doors remain open from positive pressure inside the building.

Seismic (pp21-22) [see Reaveley report 1993] Recommend determining exact location of faults. Masonry fastener damage must be ascertained. Interior skylights & plaster ceilings, suspended ceilings & light fixtures need to be braced to the existing structure. Exterior granite balustrade should be reinforced & braced, esp over the exits. Demountable partitions should be braced. All tall storage & equipment should be braced.

Operation & Maintenance (pp22-23) Clean debris from concealed spaces. Perform a periodic inspection for water infiltration & deterioration, proactive and scheduled.

Accessibility (pp23-24) see notes below

Systems/Equipment (p25) see notes below. also, design enclosure for chair lift at south entrance vestibule.

Furnishings (p26) Recommend establish consistent guidelines for furniture, signs, & misc architectural elements

OBSERVATIONS & RECOMMENDATIONS: STRUCTURAL

infancy of seismic science becomes apparent in standards, and lack of equality between retrofits and new buildings.

Proposal from AGRA to do the geoseismic study.

see notes above

OBSERVATIONS & RECOMMENDATIONS: MECHANICAL

Insulation value of the building envelope is low, but the thermal mass seems to mitigate the lack of insulation.

Original steam heating was supplied by coal fired boilers to cast iron steam radiators around the bldg perimeter, & fireplaces. Steam system removed over 30yrs ago, replaced with Hot water heating system. Current system has no treatment and is in poor condition. Personal electric space heaters are used **year round**. (cooling inconsistent in summer). 1960 mechanical cooling was added, American-Standard Tonrac 630 ton chiller, pumps & cooling tower. Chiller is oversized, netter to use the chiller plant in basement of State Office bldg. Until 1960, operable windows & large attic roof vents encouraged ventilation... (31) Ground floor needs more supply air. Basement uses independent air conditioning systems. Overall system is an unresolvable code violation (smoke).

1990 project to provide Variable Air Volume started, only a fifth of the terminal boxes have been installed.

Recommend completing this project. There are no active ventilating systems for the House & Senate Chambers. They continue to use the (pre-1960) natural convection system. House ventilation ineffective, because vent openings have been blocked. Fresh air requirements are not being met (32). No cooling or fresh air ventilation in Gold room, intolerable during summer. Yet, occupant complaints are few.

Smoke & heat detectors are monitored by a panel on the first floor with alarms directed to the security & admin areas. There is no interlock b/tw fire detection & the main fan systems. Sprinklers only in basement. No smoke evacuation or control system, though such is implied in the retrofit concept.

Vertical chases in walls may be filled with concrete and rebar if building is seismically upgraded, disrupting the entire current HVAC system.

OBSERVATIONS & RECOMMENDATIONS: ELECTRICAL (40)

Recommend old conductors be replaced with new THHN copper conductors. Old distribution panel replaced, new feeder conductors, new circuit breakers, emergency generator, surge suppressor, new branch panels, lightning protection.

Exterior lighting improved for better security. Ext fluorescent fixtures replaced with metal halide flood lamps. Lobby fixtures tied to building lighting control system. Existing incandescent lamps to be replaced with fluorescent. Fluorescent lamps replaced with new. Motion sensor switches for restrooms & custodian offices. New LED exit signs.

New fiber optic camera for Council Hall. Additional security cameras for north covered parking and east parking & entrance. Fire alarm system to meet requirements. All security cameras to be color, not B&W.

3. Cost Estimates

charts with project totals; charts with each maintenance job plotted by year (1995-2015) to spread out cost;

Construction budget, by category

4. Drawings (current and 1916)

5. Accessibility Checklist

meets most requirements listed, improvement needed in following areas: signs and paint marks at parking stalls; restroom, exit, elevator, and other signage sporadic, at wrong heights and insufficient; insufficient maneuvering space in many offices; panic hardware requires too much strength; main stairs don't conform b/c of 1" abrupt lip; handrails are 31" (not 34"-38") above nosing; north elevator modified, south not; no accessible restroom on 2nd floor; no accessible drinking fountains on 3rd floor (only 1st) "Modification of accessible work spaces is the responsibility of the individual agencies in the building."

No "areas of refuge." Requirement eliminated if building is fire sprinkled.

PHOTOS OF DAMAGE/FINDINGS: *[survey and analysis thrown together]*

6. Capitol Grounds

fuel station unsafe; conceal trash compactor (NW); poor concrete everywhere

7. South/West Stairs

detail photos of curbs, underside (W) showing water infiltration, deterioration of concrete, reinforcing, steel beams. South side stair joints, lions, vestibules need restoration; patches & staining around patches on columns; staining under soffit

8. Exterior Granite

staining, swallow nests, granite carving "in very good condition;" soffits have poorly placed square escutcheons covering round holes

9. Exterior Terra Cotta, Stucco

mortar loosened; recommended that a piece of terra cotta be removed for inspection of fasteners; some breaks shown, water penetration of cornice from roof edge above. Limestone & asbestos stucco on concrete, deteriorated from water penetration (from above). Underlying concrete appears stable. "Columns are masonry infill with ..stucco applied."

10. Roofing, Exterior Skylights

uppermost balustrade has original copper cladding; lightning rod installed but not grounded. Original drain at dome exterior walkway is easily a source of water penetration. Base flashing damage. Roof will last another 10 with periodic maintenance. Skylights are old and rusted. Leaks during rain are evident on underside. Screens on skylights minimize damage from falling ice.

11. Drum, Attics and Exterior Windows.

roof vents damaged from falling ice. Steel frame connections inside dome are rusted: recommend chemical survey. Fluorescent lights added above House chamber for constant light levels below. Reinforcing not used in hollow clay tile construction. Water penetration in attic spaces. Inside pediment, detail of steel straps fastening granite: no lateral restraint. Drum windows need repair

12. Interior Offices/Public spaces

storage in corridors, partitions to ceiling inhibit air circulation; first floor aesthetics abhorrant; hex tile floor cracks; poor and non-historical vents; suspended ceilings in poor repair

13. Light Fixtures

light fixtures in pediment ill-concealed and intrusional

14. Signage

Exterior signage inconsistent, deteriorating and does not meet current accessibility guidelines; temporary and permanent signage mixed together, sometimes paper is “permanent.”

15. Mechanical

chilled water pumps deteriorated; many roof exhaust vents non-operational; remove sound dampers from return air grille; dirty filters; fan coils in poor condition; original natural convection roof vents in need of repair (protruding from atrium skylights on roof); office computers & Xerox machines need cooling systems. Original supply air grilles in Senate chambers are no longer in use.

Addendum May 3, 1996 concrete core test results The Erlin Co (see that date for notes)

9.29.95 **XI. DETERIORATION CAUSES, EFFECTS AND SOLUTIONS** (2 COPIES)

Jim Hanlon, Cathedral Stone Product (for Eldredge & Nicholson)

[see also photos by Vic Middleton of Utah Tile and Roofing, now of DFCM]

1. Introduction (1-2)

Small attempts at restoration done without investigation to cause of deterioration. Evidence of attempts at repointing. Much of concrete on grounds is later addition. Original plans not used in investigation, b/c they were not strictly followed in original construction, resulting in inability to check original design detail in regards to joint placement.

Initial report cited failed joint design & installation as primary cause of deterioration. While accurate in areas, *after actually visiting the site*, several other causes arise. Much of the deterioration is normal for 80yrolld bldg. Failure of maintenance (repointing & replacing sealants) is major initial cause of problems found.

3. Glossary of Terms (4-6)

4. General Conditions of Deterioration (7-9)

generally “in a severe state of deterioration.” Corrosion (accelerated deterioration) found everywhere. Terra cotta glazing ineffective due to the normal effects of ultraviolet exposure & atmospheric carbonation. Environmental carbonation on concrete exists, but causes no distress presently. Water intrusion through failed sealants, bowed panels, & random crack has caused oxidation of primary & secondary

reinforcing steels.

Erosion of top layer of granite. A few places have spalled, but the general effect is erosive. Several rust stains from original anchors, balustrades with substantial spalls, caused by combination of settlement stresses, & moisture entering therein.

Interior marble has minor deterioration, from abrasion, buckling of pillars, & horizontal floor areas.

Drum pillar coating is thick and delaminating rapidly. No info on coating age, from inspection guess that coating is quite old, and has given sufficient expected service life.

5. Specific Areas of Deterioration

so much leaching & saturation, difficult to determine depth of water penetration & corrosion, & estimate cost of repair.

DECORATIVE TERRA COTTA SKIRT ABUTTING COPPER DOME (II-28)

direct leaching of the copper dome. Metallic particles saturate original joints, mortar destroyed. Sealants complicated issue by containing solvents, causing staining & softening of terra cotta. Complete absence of joint material, water is simply pouring in unimpeded. All existing sealant should be removed, joints cleaned. Don't suggest elastomeric polymer sealants (staining). Lower joint repointed with cementitious pointing mortar, glazed (unusual to glaze joints, but location warrants it). Top joint pre-molded self expanding joint filler (for dissimilar materials with difficult adhesion). Filler is chemically resistant. Add flashing as well. This area of deterioration too remote to trust to periodic maintenance.

Lower joint width to be abt. $\frac{3}{4}$ ", installed at about \$165. Top joint installed approx. \$3/lin ft, abt. \$264.

Decorative vertical "wave" detail terminates onto drain area, 14" wide, 20" long, each section has 3 (25 sections). Designed to allow the flow of water to continue onto the connected skirt to next landing. large crack, "sealed" inappropriately.

Deterioration caused by lack of sun (western side) to dry moisture. (cool & damp 20/24hrs/day)

Slope on 22/25 sections is facing inward rather than outward: more water being trapped, puddling. Section removal necessary to discover extent of deterioration. Treatment of all corroded anchoring is 90% of solution.

Right section of 21/25 units needing repair (center & left section little deterioration). [damage illustrated with photos]

Vertical/diagonal cracks on brackets from 6-60." 22/25 right side cracking vs. 15/25 left side cracking. West side most severe.

Cracking has created hollow unit portions: floating sections. Intrusion began with deterioration of glazing, saturation of terra cotta, swelling.

Solution includes wire mesh for mortar. "Despite the proper or improper spacing of original expansion joints, many such joints may now be obsolete because of the volume change in the Terra Cotta." Stress has changed, and must be rechecked, recalculated.

Glazing is original, by available information. Current conditions of deterioration, can't have been existing more than about 10 years. Re-glazing of utmost importance. Any repair will be a waste of funds if glazing is ignored. Must be reglazed immediately after repairs. Surface cleaned (high pressure water blasting, with surface cleaner to loosen soil & reduce pressure). Some material may require partial or total removal of original glazing, a major consideration (costly & time consuming) in product selection. (more photos)

Chain of deterioration: Western exposure, terra cotta glazing, terra cotta cracking, structural concrete

deterioration, interior rotunda damage (22).

Colonnade level with balustrade parapet walls (29-35) very much the same as upper level: cracked, missing & attempted repaired mortar joints, random spalling, stress cracks, deteriorated glazing. Newel post caps loose or detached; anchors gave no resistance to removal. (good photos)

pH of 4 to 5 (acidic) is perfect environment for anchoring corrosion. Again, western exposure has moisture susceptibility, old glazing, swelling of terra cotta, cracks & spalling, intrusion of water into joints, corroding anchors. All due originally to lack of maintenance.

Cracking of mortar joints due to structure movement, also corroded anchoring. Normal thermal change, faulty placement, and age all contribute, but only minutely.

MIDDLE DOME COLONNADE (36-39)

column base (photo) 46" across by 14" high. Core of the pillars is **“natural stone resembling slate and/or shale, and the exterior itself is a parge coat of a cementitious mix. The pillars are coated with a thick white coating which is delaminating in differing amounts throughout.”** It is entirely possible/probable that the coating has been applied since original construction. “Coating is probably of a natural resin composition originally solvent in aromatic hydrocarbons (mineral spirits or stronger) since 1914 was prior to the advent of current synthetic polymer technology.” Remedy consists of patching of the base substrate and recoating the pillar. (only 4 pillars requiring repair). Recommend complete removal of existing coating, simple recoating will lead to rapid failure. Restoration should proceed as if the building were newly erected. Pressure washing & commercial grade stripper suggested. Sandblasting possible, but not as safe.

REAR ENTRANCE STAIRWELLS (40-54)

corrosion & deterioration of stairs (mainly right side) due to internal stresses. Failed sealants, serious internal deterioration dangerous. Spot corrosion on roof perimeter of garage

ROTUNDA (55-60)

moisture spots & peeling coating evidenced on western side. Small spalls, war marks on marble corners, random cracks in floor panels, slight corrosion on several of the spalls. Initial report included theory that exterior deterioration had reached the inside; site visit confirms this. Bowing of vertical pedestal bases. floor cracking is unsightly, but it's a gamble to repair. Staining of ceiling is largest problem at present, revealing extent of exterior damage, condition is critical, esp. in Senate chambers & in the hall to the right of the House. Buckling panels should be addressed eventually, but their setting/replacement is not critical now. Interior stains must be treated (when moisture intrusion is fixed) with a stain blocking primer.

MONUMENT AND GENERAL EXTERIOR GROUNDS (61-76)

Extremely severe deterioration. Recommend cathodic protection or complete replacement. Treatments which claim to cure corroded concrete cannot be trusted, reasons given (65).

CAPITOL EXTERIOR (77-85)

Atmospheric carbonation & pigeon feces main causes of soil. Failed mortar joints throughout. No severe examples of damage. Corrosion induced stress causing destructive pressures resulting in spalls. Recommend rejoining.

Moisture intrusion caused all the damage witnessed on the structure to date, and much could've been avoided with proper maintenance of joints and surfaces.

10.12.95 **XII. CAPITAL BUDGET PRESENTATION** *DIVISION OF FACILITIES
CONSTRUCTION & MANAGEMENT*

- A. Based on Eldredge & Nicholson study, request of \$6,000,000 to begin work
- B. Budget
- C. South, East & West Stair Project
- D. Fire System Modifications
- E. Mechanical/HVAC Repairs & Modifications
- F. Signage Program
- G. Gold Room Maintenance

In this 19996 Budget presentation for \$6,000,000 to start the Capitol “reconstitution” process, \$1,109,000 was allocated for architectural needs. \$4,891,000 was requested for renovation of the space formerly occupied by the Attorney General’s staff.

Additional tasks included: repairs to the East, South & West stairs, an update of the mechanical and fire alarm systems, standardization of the signage, renovation of the rotunda floor, gift shop relocation, and renovation of the South elevator.

Several pages of photo documentation highlight deficiencies.

10.31.95 **XIII. ASBESTOS ABATEMENT REPORT FOR THE STATE CAPITOL
DOME** *IHI*

1. Project Summary
 - 701 sq ft of damaged (flaking) wall coating on dome from 8/24 to 9/06/95, 14 days
2. Consultant Daily Logs
3. Air Sampling Results
4. Notifications to Regulatory Agencies
5. Worker Certification: Training, Respiratory Fit Testing, Medical Exam
6. Asbestos Abatement Specifications
7. Waste Disposal Manifests

1700 lbs of asbestos coating was removed from the Capitol dome in Oct 1995. (Another document notes 1500 ft either square feet or cubic feet??? of asbestos-containing paint will be removed.) The conclusions of a bulk sampling for asbestos was that a protective coating containing asbestos had been applied to all exterior surfaces from the lower to the upper rings of the Capitol dome, except the horizontal surfaces that had been treated with built up roofing material. The asbestos material was significantly damaged and peeling from 10% of the surface. An additional 10%-15% was moderately weathered and chipping especially from the column and around the lower ring. Damage to the underlying substrate appears to be from water. 50% of the coating is in good condition.

3.22.96 **XIV. ADDENDUM REPORT: SULFATE CONTENTS OF A CONCRETE
CORE** *THE ERLIN COMPANY*

concrete strengths appear to be a result of the original mixes, not the result of water penetration. quoted in Calder-Kankainen report below

4.29.96 **XV. ADDENDUM REPORT: CONCRETE AND STRUCTURAL STEEL TESTING RESULTS**

Calder-Kankainen, Consulting Engineers (requested by Dwight Nicholson) sampling and testing provided by Professional Service Industries (PSI) limited investigation of observable efflorescence & rusting on the interior surface of capitol dome, comparing samples from an area showing the greatest signs of deterioration with an area showing the least.

Steel splice plates: range of loss from 0%-9%, avg 3% (*relatively minor*) for the connections measured, which were targeted as being the most corroded.

Concrete Core: areas of little & high efflorescence, density 129.5 pcf and 133.6 pcf; avg strength 1303psi and 2453psi

strength actually increases in areas of high efflorescence.

Petrographic Examination: difference in compressive strengths directly related to water-cement ratios. There is NOT chemical attack responsible for differences in strengths. Only chemical alteration is carbonation of the pastes, which is a normal consequence of aging & the very high water-cement ratios. The cracking and delaminations are due to cyclic freezing. (quoting Erlin report above)

Efflorescence Sample: mostly thenardite (Na_2SO_4) with minor amounts of calcite (CaCO_3)

Sulfate Profile: low sulfate levels in cement by modern standards; all of it can be attributable to the Portland cement. The thenardite sulfate salts in the efflorescence are not a result of sulfate attack of the concrete, but are probably to atmospheric pollutants on the surface of the dome.

cores were taken from the inside of the outer dome: 4 panels cored (2 & 2). 3 cores taken from each panel: 2-2" and 1-4"

6.13.96 **XVI. GEOSEISMIC & GEOTECHNICAL EVALUATION** (3 COPIES)

AGRA EARTH & ENVIRONMENTAL, INC

- A. Locate & Evaluate active fault(s)
 - 1. review of geologic literature & maps
 - 2. examination of stereoscopic aerial photographs
- B. Evaluate soil conditions as they pertain to proposed seismic upgrade
 - 1. field program: 14 exploration borings at 10-40ft
 - 2. down-hole shear-wave velocity profile, and two trenches
 - 3. laboratory testing
- C. Data analysis and conclusions

Geotechnical Investigation (April 29, 1998) follow up report, in Sear-Brown file, Allen's office

This report dated June 1996 evaluated whether an active fault(s) is present near and /or beneath the Capitol and its location (s). Also to evaluate soil conditions at the site as they pertain to proposed seismic upgrade.

In a previous study, Carrey (1992) inferred that faulting may extend southeastward from Warm Springs fault to the foundation of the Capitol. (pg 2) Such a fault would represent a potential fault rupture to the building.

During the field program evidence suggested faulting may be present in Capitol soils. (pg 6) However, the final recommendation states that the evidence provided by the 14 borings and two trenches showed

an absence of faulting. Therefore, the inferred Capitol Hill fault zone of Curry does not project through the central part of the Capitol. Interpolation of the boring data suggests that **traces of an active fault do not exist.**(pg 16)

Also earthquake landslide potential is very low and ground water is at 60' level.

Based on the building plans and subsurface conditions observed in the borings and trenches, the foundations of the building have been established in the silt/sand and gravel sequences. (pg 20) These conditions extend at least 12' below the footings.

Seismic upgrade is expected to result in increased foundation loads. In AGRA's opinion these loads can be supported on modified or in some cases completely new spread continuous footings. (pg 21)

Existing foundation pressures are approximately 5 to 7 kips/sq ft. For the design upgrade and considering the footings bear on the silt and fine sand sequences, Agra recommends using an allowable net bearing pressure of 6,000 lbs/sq ft under real load conditions for footings with a minimum plan dimension of 5' established at the level of existing foundations. Footings designed for this pressure must have a minimum embedment depth of 3'. Footings with a plan dimension of less than 18", or footings with less than 3' embedment may be designed for an allowable net bearing pressure of 3,500 psf. (pg 23)

Structural fill will be required as back fill over foundations and against below-grade structures. Structural fill should be placed in lifts not to exceed 8". 95% compaction under footings and 85% compaction for below grade structural back fill not supporting footings, slabs or pavements. Over compaction will increase lateral pressure on the wall. (22)

The final 15 pages of the report is comprised of charts for the specifics discussed above.

9.5.96 **XVII. APPRAISAL OF FURNITURE, WINDOW COVERINGS, CARPET:** **THE GOLD ROOM**

A & I Independent Appraisals

Conference Table

Sofas

Lounge Chairs

Settees

High Back Chairs

Occasional Arm Chairs

Square Grand Piano and Bench

Portier Draperies

Drapery and Valances

Area Carpet

Tri-pedestal Conference Table-\$48,000: Sofas(2)-\$36,000: Lounge Chairs (6)-\$66,000: Settees (4)-\$98,000: High backed chairs (4)-\$74,000: Occasional arm chairs (6)-\$84,000: Square Grand Piano-\$20,000: Portier draperies-\$50,000: Drapery and valances (4 pair)-\$160,000: Total 636,000. Area carpet 175,000.

JULY, '98 **XVIII. UTAH STATE CAPITOL MASTER CONCEPT** (2 COPIES)
BURTCH W. BEALL, JR.

Executive Summary

Primary function is to serve as a built symbol of Utah and its legacy of freedom and accomplishment.

This report analyzes and summarizes previous studies.. and recommends implementation of phases that would resolve questions of cost, structural stabilization, material deterioration, life safety and mechanical and electrical systems (p.3)

Scope of present report does not allow for extensive analysis of the existing building or original drawings. It relies, instead on the conclusions and observations of the previous studies. Differences of opinion have been noted, as have areas that have not been the subject of previous analysis, but it has not been possible to resolve these differences or fill in these blanks. That must be the subject of future work. (p.6)

A. Technical Summary of previous reports and existing conditions

1. Architectural Issues (fire, emergency, elevators, ADA, security, ext & int materials) Over last 80 yrs, we have learned that much of the hazard in fires is created by smoke, and fires are usually fueled by combustible furnishings & supplies rather than building materials. Compartmentalization & fire suppression combat these.

Elevators have been periodically maintained, but should be replaced. A modern bldg of the capitol's size would be expected to have a single bank of four or more public elevators, as well as private elevators for security and freight purposes. Barriers to access include toilet rooms, doors, marking of stairs for the visually impaired, signage. Better security requires better control of vehicles close to building, video, and private elevators/corridors for officials (p.10)

*Exterior:*Granite: simple cleaning

Terra Cotta: waterproofing main goal

Concrete & stucco: expected to show more deterioration, much requires replacement

Roofing & Flashing: good condition

Skylights: seismically hazardous. design relies on asphalt for continued waterproofing. Exterior skylights should be entirely replaced with a modern skylight system.

Windows: aluminum 30 years old, prudent to replace for energy conservation

*Interior:*Exterior walls: vent spaces called "plaster blocks" which may be inferred to be hollow cast gypsum blocks, stacked and mortared together with plaster. These are presumably unreinforced and pose a considerable risk of collapse in an earthquake.

Partition walls: hollow clay tile, seismically unstable

Plaster and lath: attached directly to the ribs of the concrete structural slab. Similarly on the inside of the dome, attached to the steel dome structure. This location has extensive water damage under the canvas murals.

Flooring: both tile & marble exhibit considerable cracking. Difficult to ascertain without additional study whether this is a problem or not.

Interior skylight: many held in by gravity; historic, difficult to replace.

Doors & frames: good condition

Marble ornament: good condition, may require anchoring Much of ornament is seismically unsound, including exterior walls, interior partitions, skylight & marble ornament

2. Site Design Issues (vehicular, pedestrian, landscaping, site planning) Previous studies have not addressed site design issues. Vehicles should not be allowed near building for security reasons. This may lead to revised circulation patterns, controlled entry points, or increased surveillance.

Most pedestrian surfaces are concrete: other materials should be investigated as pavement is replaced. Monument access does not conform to ADA Most notable change is general loss of landscape area, removed to accommodate cars & other vehicular access, and for the construction of office and food service buildings. “There has apparently been a *Landscape Analysis completed by Dell Cook, ASLA*, which the Grounds Dept has been implementing...” (p.15) Original thinking about an outdoor plaza (public gathering) may be timely again.

3. Structural Design Issues (vertical loading, lateral loading, ornamentation, other)

When constructed, lateral loads only calculated for wind, not earthquake. 1991 study considered 3 options: tear down/rebuild; bracing; base isolation, recommending 3rd. It is believed that remodeled items agree with current seismic bracing standards. This office strengthened & anchored cupola & main entry steps (incl provision for future seismic isolation). Believe that no strengthening of roof has occurred. Phasing the work could easily double the cost of construction. (p.19) “Recent soil studies have found no traces of the fault running under the building. The studies have also shown that the bearing soil is of high quality for supporting new and existing foundations, and that problems associated with ground water, liquefaction, soil instability, etc., do not exist.” (p.19)

4. Mechanical (heating, chilled water, air handling, plumbing, fire protection basement used originally for the livery stable and record storage... (p.20) In 1960, mechanical cooling and forced ventilation were added [4 large air handlers], and the steam radiator system was replaced with circulating hot water heating system. Existing heat exchangers and central plant may not have enough capacity to provide the required heating for the increased outside air demand. Currently, chilled water capacity is sufficient. 1990 project begun to provide Variable Air Volume (VAV) capability, including terminal boxes and digital controls. Central air handling systems should be replaced with new heating and cooling coils; existing systems should be provided with new filtering, and the systems should be provided with new tighter sealing outside air and return air damper to more effectively seal against the outside air.

The air distribution ductwork systems need to be modified to allow for flexibility in the distribution systems and to provide the volume of air required to meet the loads. The concept of the air being delivered to the floors through multiple vertical shafts, as is currently being done, still has merit... (23)

Piping systems: poor condition; maintenance personnel repair leaks without upgrade

Recent codes now require use of reduced water usage fixtures.

Roof drain fixtures need replacement (based on visual observation)

Fire sprinkler system not only for basement.

The existing detection & alarm system also need upgrade and expansion.

5. Electrical (power, emergency power, lighting, Data, fire alarm, security, lightning protection)

Code violations: feeder traverses bldg; switchboards have inadequate interrupting capacity.

Distribution system will require replacement, with new electrical closets, vertically “stacked”

Fire alarm system obsolete; intelligent detectors & remote annunciation needed

Security cameras, door monitoring, card readers & key pads, also central reporting of all system events recommended (28)

B. Strategic Plan for addressing critical issues of future projects

1. Programming & Scheduling Amount of space required by 500 permanent employees is roughly 100,000 SF (based on 200 SF per employee) Legislative session out-house: could be in temporary building, on other state property (State Fairgrounds), in a state University space, or at a convention center (not recommended)
2. Cost and funding
3. Public relations
4. Project Implementation
5. Preservation Board tasks

A good read, valuable information is summarized.

11.9.99 **XIX. CAPITOL HILL COMMUNITY MASTER PLAN** (REPLACES 1981 PLAN)

A. Capitol addressed II-5-1 to II-5-3, mainly parking concerns

12.20.99 **XX. MEMORY GROVE CONCEPT PLAN** LANDMARK DESIGN

The 1999 Memory Grove Concept Plan budget for proposed short and long term improvements was \$ 6,082,942. This plan set a framework for future changes and improvements in the park.

Memory Grove is one of the premier open spaces in Salt Lake City and is located adjacent to the Capitol site. Close coordination between the Capitol Preservation Board and the Memory Grove Park Steering Committee should insure linkages between the two sites are maintained and strengthened.

The form of the West slope of Memory Grove was heavily modified when excavated soil from the Capitol building construction was pushed over the upper edges of the canyon. Now the width and free-flowing traffic along East Capitol Street forms a barrier between the two sites. State Capitol visitors have few clues that indicate Memory Grove is nearby.

A pedestrian crossing zone and “traffic calming” techniques could improve linkage. One approach is to narrow the driving surface of the roadway and widen the Eastern edge into an entrance zone. Another action that may be beneficial to both sites is moving monuments from the Capitol to a more appropriate site in the Grove.

5.25.00 **XXI. INTERVIEW (ALLEN) WITH ANDY SEPPI, UTAH TILE AND ROOFING 1995.**

Finish prior to Senergy (EIFS) contained asbestos (see Oct 31, 1995 report)

New roof put on c.1990 over lower flat roof; removed existing roof down to concrete; installed 4-ply built-up membrane. 5/8” thick total + roof insulation (Perelite board—FESCO) 1-1/2”±, directly on concrete, asphalt coating (1/8”±) on 4-ply; + alum. paint (Johns-Mansville) on top of asphalt. Visible cracks now are only in asphalt, not leaking through.

A.S. inspected roof after 1999 tornado; found roof not leaking.

Old roof was in bad shape

“Lifetime” by General Electric was coated over Senergy in '95 as waterproof sealant, silicon based & attracts pollution.

Tried removal with various products but none worked. Old asbestos coating still there (only loose material removed).

Underlying material is beige, not imitation granite.

Tried to match existing color & texture. Original has “hair” [horsehair binder was typical in 1915 according to Jack of IHI] fibers (asbestos?) in surface coat.

Put new roofs on 3 upper levels & caulking.

NIELCO re-did cupola in c.1993: repainted vert. metal, re-soldered metal floor, repaired cornice ornament, repaired or replaced dome light. Burtch Beall, architect.

Lots of pollution from ____ trim refine_s, + lots of wind

Utah tile and roofing also put new roofing on top cornice c1990. Also replaced lighting on cornice that lit the parapet walls & pediment. Beall. Also new lights in soffit. Wasatch Electric [487-4511 1574 So. West Temple] was contractor—all exterior light from soffit—up. Lights in curbs with caps. Installed clip-on life line. Put sheet metal on deteriorating inside of parapet walls. Walls never fixed; no seismic capacity or remedy. Step-gap. O to skylights. ____ put in pediment roofs.: built-up, CAP sheet, granular. Put elastomeric coating on lower balcony floor. “Accogard,” flush-applied with fabric (“Remzy”) on cracked.. reinforced metal flashing terne-coated stainless (at 2 levels), copper flashing along pediment. Installed structural steel flagpole supports tied into cone-deck. Terra cotta caulked only.

Smalley & Co. distributors did the caulking. Don Cochiver/ Waterproofing West installs caulking.

Dome metal by Seashore/McCullough in c.1970.

Seismic & terra cotta need next work. Skylights need replacement & leak. No funding previously. 2 end roofs have not been redone.

Tops of back of pediment walls & skylight walls & base of dome.

Lots of damage in wall from roof. Level-up (below balusters). 22 ga. galvanized metal panel cover now lead counterflash installed on tops of column & pilaster capitals.

Removed & repaired windows [Replacements Systems Int'l 616-345-8214 Kalamazoo, Michigan] Replaced damaged wood & glass; coated with special paint (lead-based paint removed) hardware removed (stored), windows now fixed. Left frames & repaired them.

Steve Berger, renew plaster options. They did Senergy application 533-0993, 218E 12650 S. Poor previous, step-gap remodels. All been worked on.

Utah Tile and Roofing folders:

Replacement Systems International (Wood window restoration)

inner framework had a web that was not continuous with the inner Mullen [sic.] also, the window did not have the typical mortise & tenon frame. The frame was constructed of two separate pieces that were lapped on top of each other and when the windows arrived in Kalamazoo most of the bottom rails fell out. All of these factors created a poorly constructed window. Dick could not believe how the window had withstood the elements for as long as they had. The only thing holding them together was the putty.

problems with the large Pivot sash. Job proposal outlined.

Epoxy chemical reconsolidation, reglazing and finish painting, hoping to ship windows the latter part of February. Restoration (rebuilding, not repairing) sash. Wood absorbed more of the liquid epoxy than is normal, requiring 2/3 treatments rather than one. Will inform first week of March Glazing and four coat paint finish. Glass thought sand blasted discovered is merely spray painted. It

appears that those that were sprayed were done as an afterthought, while painting the sash, and is not historic. DFCM decided that the windows would not be operable after the reinstallation. Detail of new mullion attachment.

Had to trim the two new windows (not original) for installation.

Much better constructed now than when new and should last at least another 80 years.

Electric

Hooked up 24 light fixtures on the second ring of the dome. They were full of water, and thinking the ballasts were probably no longer good. Old abandoned electrical conduit is cleaned up in the crawl space in the soffit of the colonnade ring. Wasatch Electric and Dave McKay met to label the abandoned electrical lines in the crawl space.

Coating

Voids, cracks, bridging, discoloration in coating, Dec 1995 Lifetime sealant causes pollution staining, Berger agrees to help pay for yearly cleaning. Specs on Senergy & Lifetime.

Contact information for repair team. Details of new roof. Punch list. Joe Legori has window hardware & light fixture plates.

Prudon, Theodore H.M. "Architectural Terra-cotta: Analyzing the Deterioration Problems and Restoration Approaches." *Technology and Conservation*, Vol. 3 (Fall, 1978), pp. 30-38. The Ehrenkrantz Group, P.C., New York, New York.

Theodore H. M. Prudon Adjunct Associate Professor of Historic Preservation M.A., Delft University of Technology, 1969; M.S., Columbia, 1972; Ph.D., 1981. William F. Kinne Fellows Traveling Fellow, 1972. Member, Royal Dutch Society of Architects. N.C.A.R.B. certificate. Columbia University

UTAH TILE AND ROOFING NOTEBOOK

This notebook is a collection of Utah Tile and Roofing correspondence and product data dating from 1991 to 1996.

- Dimensioned plans and an elevation of the capitol lantern introduce this notebook along with a section of general information about the dome.
- Original sashes of the upper casement windows were restored Aug 1995 in Kalamazoo by Replacement Systems. The restoration included epoxy chemical reconsolidation, reglazing and finish painting. These windows were not typical of their time. The inner framework had a web that was not continuous with the inner Mullen, also the window did not have a typical mortise and tenon frame.
- Glass in the large pivoted windows was sprayed when painting the sash—the sprayed glass was not historic.
- Windows were not operable after their reinstallation.
- A copy of the window restoration specification is filed under windows.
- Specs call for high quality paint for the window frames. 8 gallons for the upper dome frames and 6 for the lower.
- A lifetime sealant water resistant barrier was sprayed on the dome.(Aug 1995)
- Terra cotta stone survey was conducted by Cathedral Stone Products in Oct 1995.
- Price quotes for the dome's cast iron roof drains was submitted in Oct 1995.
- Aluminum roof coating for the flat areas of the dome were quoted in Aug 1995.
- Cathedral Stone reports the possibility of structural damage related to the terracotta. July 1995 in

another report Cathedral Stone describes the problems of the terra cotta as a result of improper placement of expansion joints. Cathedral Stone diagnosed the terra cotta problem as internal and as sacrificing the integrity of the structure. Complete restorative measures were advised. In this 6 page report specific areas of deterioration were listed with possible causes and fixes .

- Sampling and analysis of asbestos content of 14 different areas of the dome were performed in June 1995. Results ranged from 25% chrysotile asbestos to none detected in three of the areas.
- A lead based paint survey was conducted in July 1995. Some results showed high levels of lead.
- Burch Beall conducted a study of the terra cotta in conjunction with Theo Prudon. (no results)
- There was a problem with dirt collecting on the Lifetime sealant. A proposal was made to clean the sealant each year for five years. At one point an unsuccessful effort was made to remove the sealant.
-